

What is claimed is:

1. An aerodynamic bug diversion system for creating and directing an
airflow shield to prevent bugs and other lightweight debris from hitting the
windshield of a moving vehicle comprising:
5 an array of vortex generators affixed in a line substantially at a right
angle to the direction of vehicle travel at a leading edge of the vehicle for
creating a channeled and uniform laminar airflow; and
 an airfoil having at least 2 foils held spaced apart and substantially
10 parallel to one another for collecting and redirecting the airflow created by
the vortex array;
 characterized in that the airflow through the airfoil is redirected as a
substantially flat and uniform flow traveling upward in a plane substantially
parallel to the plane of the windshield providing a divertive shield against
15 bugs and debris hitting the windshield.
2. The bug diversion system of claim 1 wherein the airfoil is formed of one
polymer piece in a molding operation.
- 20 3. The bug diversion system of claim 1 wherein the airfoil is formed of 2 or
more polymer pieces and is assembled.
4. The bug diversion system of claim 1 wherein the at least two foils are
held spaced apart by a plurality of support fins, the fins aiding in channeling
25 the air flow.
5. The bug diversion system of claim 1 wherein the airfoil is formed of
aluminum.

6. The bug diversion system of claim 1 wherein the airfoil is adjustable to a specific profile, adjusting one or both of the spacing and the direction.

7. An airfoil for directing an airflow shield to prevent bugs and other
5 lightweight debris from hitting the windshield of a moving vehicle
comprising:

a base foil having a forward protruding lip for collecting incoming
airflow and an upright curvature substantially following the angle of
protrusion of the windshield from the vehicle; and

10 an upper foil connected to and spaced-apart from the base foil at a
position elevated from and substantially parallel to the base foil;

characterized in that the space between the base foil and the upper
foil functions to redirect airflow in a path substantially parallel to the
windshield, forming a bug shield of moving air.

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8. The airfoil of claim 7 wherein the upper foil is held rigidly above the
base foil by a plurality of support fins, the fins aiding in channeling the
airflow.

20 9. The airfoil of claim 7 wherein the airfoil is formed of one polymer piece
in a molding operation.

10. The airfoil of claim 7 wherein the airfoil is formed of 2 or more
polymer pieces and is assembled.

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11. The airfoil of claim 7 wherein the airfoil is formed of aluminum.

12. The airfoil of claim 7 wherein the airfoil is adjustable in one or both of
direction and/or spacing.

13. The airfoil of claim 7 wherein the base foil has at least two windshield support feet adapted as standoffs to the windshield.

5 14. A method for preventing bugs and other lightweight debris from hitting the windshield of a vehicle comprising steps of:

(a) collecting an incoming airflow in an airfoil having at least an upper foil and a base foil while the vehicle is in motion; and

(b) redirecting the captured airflow through the airfoil in an upward
10 direction substantially parallel to the windshield.

15 15. The method of claim 14 wherein in step (a) the incoming airflow is channeled, prior to the airfoil, through an array of vortex generators.

16 16. The method of claim 14 wherein in step (a) the airfoil is a contiguous piece formed in a molding operation.

17. The method of claim 14 wherein in step (a) the airfoil is formed of 2 or more pieces that are assembled together.

20 18. The method of claim 14 wherein in step (a) the airfoil is adjustable in one or both of spacing and direction.

19. The method of claim 15 wherein in step (a) the foils comprising the
25 airfoil are held apart by a plurality of support fins, the fins aiding in channeling the air flow created by the vortex array.

20. The method of claim 14 wherein in step (b) redirection is accomplished through curvatures formed in the airfoil.

21. A system for reducing drag on a land-operating vehicle, and therefore increasing fuel efficiency, comprising an array of vortex generators, each presenting a substantially vertical foil to an airstream created by driving the vehicle through ambient air, the array affixed to a surface of the vehicle and
5 extending substantially in a line at a right angle to the direction of vehicle travel, the system reducing turbulence and enhancing laminar flow.

22. The system of claim 21 wherein the line of generators is imposed along
10 a forward position on a hood of the vehicle.

23. The system of claim 21 wherein the line of generators is imposed along a forward position on a cab top of the vehicle.

15 24. The system of claim 21 using two lines of generators, a first line of generators imposed along a forward position on a cab top of the vehicle, and a second line of generators along a forward position of a hood of the vehicle

25. The system of claim 21 wherein individual generators are aligned to
20 spread the laminar flow created to a width greater than the width of the line of generators.